MANUFACTURE OF "URIKARIPPU" DRY-CURED HAM AND ITS PROPERTIES

Mikami, M., Sekikawa, M., Shimada, K.
Laboratory of Meat Science, Obihiro University of Agriculture and Veterinary Medicine, Obihiro 080-8555, Hokkaido, Japan

Background

Manufacture methods of cured ham in Japan was regulated in 1982. Its production has been increasing gradually and was 6,031 t in 2001. This cured ham is made from pork loin and manufacturing period is about 1 month. Import of Parma ham was permitted in 1996 from Italy, and Serrano ham was in 2000 from Spain. These dry-cured hams are typical ham with bone and their manufacturing period takes long time for 1-2 years. Small numbers of Japanese want to produce the dry-cured ham. However, there is few data concerning the techniques and knowledge of dry-cured ham in Japan.

Objectives

Amount of meat products in Japan maintains about 520,000t last few years. Dry-cured ham (European type) production is very little because of long manufacturing period, 1-2 years or lack of techniques in Japan. Climate of Tokachi prefecture in Hokkaido is cold in winter and hot in summer with low humidity that is suitable for the production of dry meat products. We tried to produce the dry-cured ham under the climate of Tokachi prefecture and analyzed some properties of them.

Methods

Manufacturing process; Fresh hams weighing 10 - 11 kg, live weight 120 kg, 6 months old, were processed 1 day after slaughter. The manufacturing procedures followed the example of Spanish and Italian types of dry-cured hams. The curing ingredient mixture was 25-50 % sodium chloride containing of little amount of nitrite, nitrate, sugar and pepper and the cured ham was stored salt-coated at 2 - 3°C for 3 weeks. Then salt is remove and cured ham was hung a rack for 1 - 1.5 years. During these drying and ripening period, surface of cured ham was washed with water at 3 months and covered with pork fat containing salt and pepper at 5 months. The curing was started from beginning of October to end of January. This period is the cold (below 10°C) and dry season. Temperature from December to March at the outside was below 0°C and became to –30°C sometimes. So heating system was necessary to prevent getting frozen and moisture was supplied to protect over-drying at the same time. During summer, mold grew on the surface of dry-cured ham at the over 15°C, but growing of mold could been suppressed at the low humidity below 60%RH.

Microbiological analysis; Microbial number of surface was performed by swab method on the 4 positions. Bacterial number of inside was analyzed 4 muscles, i.e. *M. biceps femoris* (BF), *M. quadriceps femoris* (QF), *M. semimembranosus* (SM), *M. semitendinosus* (ST). Common bacteria (standard agar, Eikenn), lactic acid bacteria (MRS agar, OXOID), Coliform group (Chromocult COLIFORM agar, MERK), mold and yeast (Potato Dextrose agar, BBL) were measured.

Chemical analysis; Water content, pH, sodium chloride content, nitrite concentration and Aw were determined on the 4 muscles. Peptides and free amino acids were measured by Lowry method and by OPA (o-phtalaldehyde) reagent from 2% TCA solubles, respectively.

Sensory evaluation; Panelist composed of university staffs and students performed by 5 point score.

Results and discussions

The condition of curing and drying at the cold temperature suppressed putrefaction of dry-cured hams during the hot summer. Maximum of microbial counts of the surface were 1.2×10^3 cfu/cm^2, 7.0×10 cfu/cm^2 and 3.9×10^2 cfu/cm^2 on the common bacteria, Lactic acid bacteria and mold, respectively. However, most of the samples were 0 or below 30 cfu/cm^2. In generally, microbial counts of the surface were large number on the ham which mold grew on the surface during the drying and ripening. When temperature and humidity are over15°C and 60%RH, respectively, mold grew on the surface of dry-cured hams. In this time, dehumidifier was used from June to September, and mold growth was suppressed by reducing the humidity to 60 %RH. This result brought low microbial counts on the surface of dry-cured hams. Dominant bacteria were Micrococci and small number of Bacillus. Coliform groups were almost negative except 1 sample (1 colony).

Bacterial numbers in insides of dry-cured hams (BF, QF, SM, ST) were almost 0 or below 300 cfu/g on the common bacteria and lactic acid bacteria. Coliform groups were almost negative. *Staphylococcus aureus* and *Salmonella* were not detected on the surface and inside of dry-cured hams.

Japanese agriculture standard describes that the ham with mold is low grade. From these results, Urikarippu ham was microbiologically clean.

A water content was different among the muscles, minimum was 42.1 % in ST and maximum was 57.9 % in BF. Average water content was 50.5 – 56.3 % in 4 muscles and it decreased in order to BF, QF, SM and ST. Rodriguez et al (1994) reported that 8 months Iberian ham was 51.2 % in BF and 16 months Iberian ham was 50.4 %.

Average of sodium chloride content was 10.0 – 11.9 % in 4 muscles. The order of content of sodium chloride was the same as water content. This is related to fat and water content, and ST is marbling meat and BF is lean meat. According to the recent report excess intake of sodium chloride is not good for health, i.e. high blood pressure. So in Japan, sodium chloride in cooked hams and sausages is below 2%. The standard of sodium content of dry-cured ham is over 5.5 % in Europe. However, sodium chloride content at the Japanese market is 6.7 – 7.3 % in domestic and imported dry-cured hams. So in this experiment, it is necessary to reduce the sodium chloride content.

Aw was 0.82 - 0.85 and these values were lower than marketed cured hams. This reason may be low water content and high sodium chloride content. Aw of Spanish ham at 10 months was reported 0.78 – 0.85 by Perez-Alvarez et al (1999) and similar to our data. pH was range of 5.8 - 5.9. Original pH was 5.6 – 6.1, and there was not much change. These values are similar to marketed dry-cured hams.

Concentration of sodium nitrite and potassium nitrate was 100 and 200 ppm in salt, respectively. However, nitrite ion content in products was 0.16 – 0.56 ppm and maximum was 1.98 ppm. These values were lower than 5.93 – 12.36 ppm reported by Perez-Alvarez et al (1999). So when ham was sliced, colour changed to brown during half day on air. $NaNO_2$ content in curing agent of curing ham is settled over 200 ppm by Japanese sanitation low. It may be necessary 2 or three times more at the starting content.

Increment of peptides and free amino acids during the drying and ripening period increased palatability by proteolysis. The main free amino acids were Glu, Ala, Leu and Lys, and Glu and Lys increased especially.

Sensory evaluation was 3.9 points on the colour, 3.4 point on the taste, 3.2 point on the flavor, 3.1 point on the smell and 3.5 point on the

over all. The comments of panelists for saltiness were not too salty.

Conclusion

Urikarippu dry-cured ham was produced for 1 or 1.5 years in Tokachi prefecture. Dry-cured ham was microbiologically stable in hot summer by the curing and drying from autumn to spring. There was small number of mold growth on the surface of hams and was small number of bacteria in the inside of hams. Taste was good because of peptides and free amino acids increment.

Literature

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